Preliminary

NAVAL WEAPONS INDUSTRIAL RESERVE PLANT
BETHPAGE, NEW YORK
FEASIBILITY STUDY OUTLINE

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1.0 INTRODUCTION

The introduction and executive summary portions of the FS will be prepared at a later time.

2.0 IDENTIFICATION AND SCREENING OF TECHNOLOGIES

2.1 INTRODUCTION

The purpose of this section is to identify applicable or relevant and appropriate requirements (ARARs), develop remedial action objectives, and identify and screen the most appropriate technologies for remediation of the contaminated soils and groundwater. The technologies which pass this screening will be combined into remedial action alternatives in Section 3.0.

This section describes a three-step process for identifying and screening potential technologies. First, remedial action objectives are developed for the soils and groundwater. The remedial action objectives are based on contaminant characterization, risk assessment, and compliance with risk-based and ARAR-based action levels. Second, technology screening criteria are developed. The criteria are based on the remedial action objectives, site-specific parameters, and contaminant characteristics. General response actions, which address the site problems and meet cleanup goals and objectives are also identified at this time. Third, potential technologies associated with the general response actions are identified and evaluated.

In this section, the following components of the Feasibility Study (FS) are presented.

- Establish remedial action objectives (Section 2.2).
- Identify general response actions to meet remedial objectives, including no action (Section 2.3).
- Identify remedial technologies and process options under each general response action with emphasis on permanent solutions (Section 2.4). **To be supplied at a later time.**
- Screen remedial technologies and process options based on effectiveness and implementability considerations (Section 2.4). **To be supplied at a later time.**

2.2 REMEDIAL ACTION OBJECTIVES

Site specific remedial action objectives specify chemical of concern, media of interest, exposure pathways, and cleanup goal or acceptable contaminant concentration. Remedial action objectives may be developed to permit consideration of a range of treatment and containment alternatives.

When Applicable or Relevant and Appropriate Requirements (ARARs) or other federal and state guidelines are considered protective, they are used as the acceptable exposure levels. Where an ARAR is not protective (i.e., where it allows risk levels greater than a Hazard Index of 1 for non-carcinogens or greater than a cancer risk of 1×10^{-4} for carcinogens) or where an ARAR does not exist, acceptable exposure levels are identified through the risk assessment process.

As discussed in further detail in this section, NWIRP remedial action objectives and cleanup goals will be based on ARARs for groundwater. For soils, EPA CERCLA guidance is the basis for PCB remedial action objectives and cleanup goals. Risk assessment is utilized for other NWIRP site soil organics and inorganics, where ARARs are unavailable.

2.2.1 Media of Concern

This FS addresses onsite contaminated soils and onsite and offsite NWIRP Bethpage-associated groundwater. Contaminated soils and groundwater associated with the Hooker/RUCO Superfund Site and Grumman Corporation are being addressed by other parties. Also, water and sediments associated with the recharge basins are not included in this FS because of negligible risk and the consideration that they are being addressed under an existing NPDES permit.

Potential soil contaminants of concern are identified in Table 2-A (risk-based), Table 2-B (background-based), and Table 2-C (ARAR-based). Table 2-D presents a summary of potential soil contaminants of concern. The primary contaminants identified are trichloroethene, tetrachloroethene, PCB-1248, and arsenic. Additionally, barium, chromium, nickel, silver, vanadium, and cyanide are cited only because of background exceedances.

TABLE 2-A

POTENTIAL SOIL CONTAMINANTS OF CONCERN - RISK BASED
NWIRP, BETHPAGE, NEW YORK

Site Number (media)	Contaminant of Concern	Non-Carcinogenic Risk (a)	Carcinogenic Risk (b)		RI Results			
		Contaminant HI [Mixture HI]	Risk	Scenario	No. Positive/ Detections Samples Analyzed	Maximum Conc. [Location]	Rep. Conc.	CRQL/ CRDL
Site 1 (Soil)	PCB-1248	0	3.273×10^{-6}	Current Risk Adult Employee Dermal	Surface Soil 2/2	7,900 µg/kg [SS102]	7,900 µg/kg	8 µg/kg
	Arsenic	< 1.0	9.18×10^{-6}	Current Risk Adult Resident Dust Inhalation	Surface Soil 6/7	55.8J µg/kg [SS106]	33.1 µg/kg	2 µg/kg
Site 2 (Soil)	PCB-1248	0	2.818×10^{-6}	Future Risk Adult Employee Dermal	Subsurface Soil 1/1	6,800 µg/kg [SB229]	6,800 µg/kg	80 µg/kg
Site 3 (Soil)	None	---	---	---	---	---	---	---
Sites 1, 2, and 3 (Soil organics leaching to groundwater)	Tetrachloroethene	1.3 [1.4] 3 [3.2] <1.0 <1.0	2.8×10^{-4} $< 1 \times 10^{-6}$ 8.4×10^{-5} 2.57×10^{-6}	Future Risk Adult Resident-Ingestion Child Resident-Ingestion Adult Employee-Ingestion Adult Resident-Inhalation	Subsurface Soil 30/42 Groundwater 12/15	4,800J µg/kg [SB119] 360 µg/l [HN28s]	475.4 µg/l(c)	5 µg/l
	Trichloroethene	0	2.31×10^{-6} 7.5×10^{-6} 3.34×10^{-6}	Future Risk Adult Employee-Ingestion Adult Resident-Ingestion Adult Resident-Inhalation	Subsurface Soil 7/42 Groundwater 14/15	300J µg/kg [SB119] 58,000 µg/l [HN24I]	60.1 µg/l(c)	5 µg/l
	Benzo[a]anthracene	<1.0	5.9×10^{-6} 2×10^{-6}	Future Risk Adult Employee-Ingestion Adult Resident-Ingestion	Subsurface Soil 2/26 Groundwater	740 µg/kg [SB217] ND	0.1 µg/l(c)	10 µg/l
	PCB-1248	0	8.8×10^{-5} 3×10^{-4}	Future Risk Adult Employee-Ingestion Adult Resident-Ingestion	Subsurface Soil 1/? Groundwater 0/?	6,800 µg/kg [SB229] ND	3.3 µg/l(c)	---

TABLE 2-A (continued)
POTENTIAL SOIL CONTAMINANTS OF CONCERN - RISK BASED
NWIRP, BETHPAGE, NEW YORK
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(a) Non-carcinogenic risks evaluated by Hazard Index (HI) in excess of unity (1.0) for a chemical mixture.
(b) Carcinogenic risk evaluated by NCP acceptable range of 10^{-4} (1 in 10,000) to 10^{-6} (1 in 1 million).
(c) Calculated groundwater concentration based on precipitation infiltration and contaminant migration to groundwater.

CRQL/CRDL = Contract Required Quantitation Limit/Contract Required Detection Limit.
ND = Not detected.

TABLE 2-B

POTENTIAL SOIL INORGANIC CONTAMINANTS OF CONCERN - BACKGROUND BASED
NWIRP, BETHPAGE, NEW YORK [μg/kg]

Inorganic Contaminant of Concern	Background Concentration at 95% confidence limit	CRDL	IDL	Site 1		Site 2			Site 3	
				Surface Soil Max. Conc. [Location]	Subsurface Soil Max. Conc. [Location]	Surface Soil Max. Conc. [Location]	Subsurface Soil Max. Conc. [Location]	Sediment Conc. Max. [Location]	Surface Soil Max. Conc. [Location]	Subsurface Soil Conc. [Location]
Arsenic	3.6	2	0.48/0.72/0.78	55.8J [SS106]	3,380 [SB119]	10.45 [SS210]	10.7 [SB229]	---	56.8 [SS322]	4.6J [SB328]
Barium	35.1	40	0.48/0.78/1.7/2.6	59J [SS106]	30.73 [SB112]	51.6J [SS215]	---	---	107J [SS328]	---
Beryllium	<0.98	1	0.2/0.76	---	---	---	---	---	1.5 [SS322]	---
Cadmium	<1.2	5	0.94	---	4.5 [SB103]	---	---	---	---	---
Chromium	12.7	2	1.6/1.9/2.1	61.1 [SS103]	---	419J [SS216]	---	27.5 [SD200]	637J [SS328]	---
Cyanide	<2.6	2	2.0/3.1	5.4 [SS106]	13.3 [SB119]	3.1 [SS216]	---	---	4.2 [SS323]	---
Nickel	<6.2	8	1.6/4.8/6.2	19.2J [SS106]	---	10.7J [SS225]	---	---	---	---
Silver	<0.31	2	0.18/0.24/0.6	6.3 [ ]	---	6.3 [SS325]	2.65 [SB206]	0.96 [SD100]	---	---
Vanadium	17.9	10	2.9/3.7	39.3J [SS103]	---	87.7J [SS215]	---	---	---	---

J = Estimated
IDL = Instrument Detection Limit
CRDL = Contract Required Detection Limit
--- = Concentration less the background

TABLE 2-C

PRELIMINARY

POTENTIAL SOIL CONTAMINANTS OF CONCERN - ARAR BASED
NWIRP, BETHPAGE, NEW YORK [µg/kg]

Contaminant of Concern	CRQL	Regulatory (a) Guidance	Site 1		Site 2			Site 3	
			Surface Soil Max. Conc. [Location]	Subsurface Soil Max. Conc. [Location]	Surface Soil Max. Conc. [Location]	Subsurface Soil Max. Conc. [Location]	Sediment Conc. Max. [Location]	Surface Soil Max. Conc. [Location]	Subsurface Soil Conc. [Location]
PCB-1248	80	10,000 Industrial 1,000 Residential	7,900 [SS102]	Detected as TIC	1,900 [SS226]	6,800 [SB229]	Detected as TIC	830J [SS327]	ND

CRQL = Contract Required Quantitation Limit
ND = Not Detected
TIC = Tentatively Identified Compound

(a) Reference: "Guidance on Remedial Actions for Superfund Sites with PCB Contamination". OSWER Directive No. 9355.4-01. August 1990.

TABLE 2-D

SUMMARY OF SOIL CONTAMINANTS OF CONCERN (a)
NWIRP, BETHPAGE, NEW YORK

Site Number		Contaminant of Concern	Risk-Based Concern (b)		ARAR-Based Concern(c)	Background Based Concern(d)	
			Surface Soils	Subsurface Soil		Surface Soils	Subsurface Soils/Sediment
Site 1 Soils		Trichloroethene		X		X	X
		Tetrachloroethene		X		X	X
		PCB-1248	X			X	X
		Arsenic	X			X	X
		Chromium				X	
		Nickel				X	
		Silver				X	
		Vanadium				X	
		Cyanide				X	X
Site 2	Soils	PCB-1248		X		X	X
		Silver				X	
		Chromium				X	
		Vanadium				X	
		Arsenic				X	X
	Sediment	Chromium					X
Site 3		Arsenic				X	
		Barium				X	
		Chromium				X	

(a) Listed contaminant have concentrations exceeding the less stringent of twice the CRDL/CRQL or twice the background concentration.
(b) Developed from Table 2-A
(c) Developed from Table 2-C
(d) Developed from Table 2-B

For groundwater, Table 2-E (risk-based) and Table 2-F (ARAR-based) identify potential contaminants of concern and Table 2-G presents a summary. The primary contaminants include volatile organics (trichloroethene, trichloroethane, and tetrachloroethene), inorganics, and cyanide. The list includes only one semi-volatile organic, bis(2-ethylhexyl phthalate).

2.2.2 Applicable or Relevant and Appropriate Requirements (ARARs)

Tables 2-P and 2-K present a summary of Federal and New York State ARARs for the NWIRP sites, respectively. These ARARs will be refined and revised as necessary as the RI/FS proceeds. In developing and selecting remedial action alternatives, the degree of public health or environmental protection afforded by each remedy must be considered. Actions that attain or exceed ARARs are given primary consideration.

The definition of ARARs is as follows:

- Any standard, requirement, criterion, or limitation under federal environmental law.
- Any promulgated standard, requirement, criterion, or limitation under a state environmental or facility-siting law that is more stringent than the associated Federal standard, requirement, criterion, or limitation.

One of the primary concerns during the development of remedial action alternatives for hazardous waste sites under CERCLA or "Superfund" is the degree of human health and environmental protection afforded by a given remedy. Section 121 of CERCLA requires that primary consideration be given to remedial alternatives that attain or exceed ARARs. The purpose of this requirement is to make CERCLA response actions consistent with other pertinent Federal and state environmental requirements.

Definitions of the two types of ARARs, as well as other "to be considered" (TBC) criteria, are given below:

- Applicable Requirements means those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated

PRELIMINARY

TABLE 2-E

OVERALL CURRENT POTENTIAL GROUNDWATER CONTAMINANTS OF CONCERN - RISK BASED
NWIRP, BETHPAGE, NEW YORK (μg/l)

Contaminant of Concern	Non-Carcinogenic Risk[a]		Carcinogenic Risk[b]		RI Results	
	Contaminant HI [Mixture HI]	Scenario	Risk	Scenario	Rep. Conc.	CRQL (Organics) CRDL (Inorganics)
Volatile Organics						
Tetrachloroethene	5.0 [28]	Child Resident-Ing/Dermal	4.8×10^{-4}	Adult Resident-Ingestion	788	5
Trichloroethene	0	---	1.6×10^{-5}	Adult Resident-Ingestion	12,285	5
1,1-Dichloroethene	0.39 [28]	Child Resident-Ing/Dermal	3.9×10^{-4}	Adult Resident-Ingestion	54.7	5
Carbon Tetrachloride	0.34 [28]	Child Resident-Ing/Dermal	5.6×10^{-6}	Adult Resident-Ingestion	3.7	5
1,1,1-Trichloroethane	1.6 [28]	Child Resident-Ing/Dermal	0	---	2,113	5
1,1-Dichloroethane	0.12 [28]	Child Resident-Ing/Dermal	0	---	188	5
1,2-Dichloroethene (trans)	2.5 [28]	Child Resident-Ing/Dermal	0	---	772	5
Semi-Volatile Organics						
Bis(2-ethylhexyl)phthalate	0.07 [28]	Child Resident-Ing/Dermal	3.5×10^{-6}	Adult Resident-Ingestion	21.5	10
Benzo[b]fluoranthene	0	---	3.8×10^{-5}	Adult Resident-Ingestion	2	10
Inorganics[c]						
Arsenic	0.75 [28]	Child Resident-Ing/Dermal	2.4×10^{-4}	Adult Resident-Ingestion	11.7	10
Beryllium	0.017 [28]	Child Resident-Ing/Dermal	6.6×10^{-5}	Adult Resident-Ingestion	1.3	5
Cadmium	11 [28]	Child Resident-Ing/Dermal	0	---	82.9	5
Hexavalent Chromium	0.26 [28]	Child Resident-Ing/Dermal	0	---	21.1	10
Lead	1.6 [28]	Child Resident-Ing/Dermal	0	---	36.9	3
Manganese	0.26 [28]	Child Resident-Ing/Dermal	0	---	402	15
Nickel	0.65 [28]	Child Resident-Ing/Dermal	0	---	20.2	40
Thallium	0.91 [28]	Child Resident-Ing/Dermal	0	---	1.0	10
Vanadium	1.4 [28]	Child Resident-Ing/Dermal	0	---	159	50
Cyanide	1.8 [28]	Child Resident-Ing/Dermal	0	---	578	5

(a) Non-carcinogenic risks evaluated by Hazard Index (HI) in excess of unity (1.0) for a chemical mixture.
(b) Carcinogenic risk evaluated by NCP acceptable range of 10^{-4} (1 in 10,000) to 10^{-6} (1 in 1 million).
(c) Total

-- No risk exceedance

CRDL = Contract Required Detection Limit
CRQL = Contract Required Quantitation Limit

TABLE 2-F

OVERALL CURRENT POTENTIAL GROUNDWATER CONTAMINANTS OF CONCERN - ARAR BASED (μg/l)
NWIRP, BETHPAGE, NEW YORK

Compound	RI Results				Federal Standards MCLs/MCLGs	New York State Standards	
	CRQL/ CRDL	Number Positive Detections/ Samples Analyzed	Location of Maximum Conc.(a)	Maximum Positive Concentration		MCLs(b)(c)	GW Quality Standards(d)
Volatile Organics							
Trichloroethene	5	14/15	HN24I	58000	5 (FMCL)	5	5
Toluene	5	6/15	HN29S	39	1000 (FMCL)	5	5
1,1-Dichloroethane	5	3/15	HN29S	880	---	5	5
1,2-Dichloroethene	5	3/15	HN29S	3600	70 cis (FMCLG) 100 trans	5	5
1,1,1-Trichloroethane	5	12/15	HN29S	10000	200 (FMCLG)	5	5
Tetrachloroethene	5	12/15	HN28S	360	5 (FMCL)	5	5
1,1-Dichloroethene	5	4/15	HN29S	250	7 (FMCLG)	5	5
Carbon Tetrachloride	5	1/15	HN24I	8	5 (FMCL)	5	5
Ethylbenzene	5	1/15	HN29S	3J	700 (FMCLG)	5	5
Xylenes	5	1/15	HN29S	19	10,000 (FMCLG)	5	5
Semi-Volatile Organics							
bis(2-ethylhexyl)phthalate	10	2/15	HN26I	73	4 (PMCL)	50	50
Di-n-octyl phthalate	10	2/15	HN28I	17	---	50	---
2-Methylphenol	10	1/15	HN29S	2J	---	50	1
4-Methylphenol	10	1/15	HN29S	2J	---	50	
2,4-Dimethylphenol	10	1/15	HN29S	7J	---	50	

TABLE 2-F (continued)
OVERALL CURRENT POTENTIAL GROUNDWATER CONTAMINANTS OF CONCERN-ARAR BASED (µg/l)
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PRELIMINARY

Compound	RI Results				Federal Standards MCLs/MCLGs	New York State Standards	
	CRQL/ CRDL	Number Positive Detections/ Samples Analyzed	Location of Maximum Conc.(a)	Maximum Positive Concentration		MCLs(b)(c)	GW Quality Standards(d)
Naphthalene	10	1/15	HN29S	3J	---	50	---
Acenaphthylene	10	1/15	HN29S	1J	---	50	---
Fluoranthene	10	1/15	USGS	2J	---	50	---
Pyrene	10	1/15	USGS	2J	---	50	---
Benzo(b)fluoranthene	10	1/15	USGS	2J	0.2 (PMCL)	50	---
PCBs							
PCB-1248	---	0	---	---	0.5 (FMCL)	50	0.1
Inorganics (Total)							
Aluminum	200	14/15	HN27S	ND-33800	50-200 (FSMCL)	---	---
Arsenic	10	7/15	HN24I, HN28S	ND-16.4	50 (Review)	50	25
Barium	200	15/15	HN27S	9.7-211	2,000 (FMCLG)	1,000	1,000
Beryllium	5	2/15	HN27S	ND-2.9	1 (PMCL)	---	---
Cadmium	5	3/13	HNS7S	ND-392	5 (FMCLG)	10	10
Calcium	5000	15/15	---	38602-27400	---	---	---
Chromium	10	7/11	HN27S	ND-169	100 (FMCLG)	50	50
Hexavalent chromium	10	3/15	HN25	ND-174J	---	---	50
Cobalt	25	5/15	HN29S	ND-12.8	---	---	---
Copper	100	13/15	HN27S	ND-823J	1,300 (FMCLG)	1,000 (SMCL)	200

TABLE 2-F (continued)
OVERALL CURRENT POTENTIAL GROUNDWATER CONTAMINANTS OF CONCERN-ARAR BASED (µg/l)
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PRELIMINARY

Compound	RI Results				Federal Standards MCLs/MCLGs	New York State Standards	
	CRQL/ CRDL	Number Positive Detections/ Samples Analyzed	Location of Maximum Conc.(a)	Maximum Positive Concentration		MCLs(b)(c)	GW Quality Standards(d)
Iron	3	15/15	HN25S	114-155000	300 (FSMCL)	300 (SMCL)(e)	300(e)
Lead	5000	12/15	USGS	ND-124	15 (Action Level)	50	25
Magnesium	15	15/15	HN25S	277-7950	---	---	---
Manganese	0.2	15/15	USGS	7.65-1440J	200 (LMCLG)	300 (SMCL)(e)	300(e)
Mercury	40	2/15	HN27S	ND-0.2	2 (FMCLG)	2	2
Nickel	5000	6/15	USGS	ND-62.9	100 (PMCLG)	---	---
Potassium	5	15/15	HN24I	1395-351000	---	---	---
Selenium	5000	1/15	HN29S	ND-2.3	---	10	10
Sodium	10	15/15	HN29S	12100-222000	---	(f)	20,000
Thallium	50	1/15	HN24I	ND-3.1J	0.5 (PMCLG)	---	---
Vanadium	20	11/15	HN29S	ND-419	---	---	---
Zinc	10	8/14	USGS	ND-217	5,000 (FSMCL)	5,000 (SMCL)	300
Cyanide	---	4/15	HN27S	ND-2690	200 (PMCLG)	---	100
TDS	---	---	---	---	---	500 mg/l (FSMCL)	500 mg/l
Inorganics (Dissolved)							
Aluminum	200	4/15	HN29S	ND-293	50-200 (FSMCL)	---	---
Arsenic	10	7/15	HN29S	ND-43.2	50 (Review)	50	25
Barium	200	9/15	HN25S	ND-89.1J	2000 (FMCLG)	1,000	1,000

TABLE 2-F (continued)
OVERALL CURRENT POTENTIAL GROUNDWATER CONTAMINANTS OF CONCERN-ARAR BASED (µg/l)
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PRELIMINARY

Compound	RI Results				Federal Standards MCLs/MCLGs	New York State Standards	
	CRQL/ CRDL	Number Positive Detections/ Samples Analyzed	Location of Maximum Conc.(a)	Maximum Positive Concentration		MCLs(b)(c)	GW Quality Standards(d)
Inorganics (Dissolved)(continued)							
Cadmium	5	3/15	HN27S	ND-91J	5 (FMCLG)	10	10
Calcium	5000	15/15	HN25S	2730-31100J	---	---	---
Chromium	10	3/15	HN28I	ND-56.7	100 (FMCLG)	50	50
Copper	25	7/15	HN25I	ND-4.3	1,300 (FMCLG)	1000 (SMCL)	200
Iron	100	10/15	USGS	ND-568	---	300 (SMCL)(e)	300(e)
Lead	3	1/15	HN24I	ND-6	15 (Action Level)	50	25
Magnesium	5000	14/15	HN25S	ND-8330	---	---	---
Manganese	15	13/15	USGS	ND-572J	200 (LMCLG)	300 (SMCL)(e)	300(e)
Potassium	5000	15/15	HN24I	1100-35300	---	---	---
Selenium	5	1/15	HN29S	ND-3.1	---	10	10
Sodium	5000	15/15	HN29S	12100-230000	---	(f)	20,000
Thallium	10	4/15	HN24S	ND-17.1J	0.5 (PMCLG)	---	---
Vanadium	50	3/15	HN29S	ND-34.3	---	---	---
Zinc	20	10/14	USGS	ND-178	---	5,000 (SMCL)	300

TABLE 2-F (continued)
OVERALL CURRENT POTENTIAL GROUNDWATER CONTAMINANTS OF CONCERN-ARAR BASED (µg/l)
PAGE 5

PRELIMINARY

-	Not detected
CRDL =	Contract Required Detection Limit
CRQL =	Contract Required Quantitation Limit
IDL =	Instrument Detection Limit
MCL =	Maximum Contaminant Level
L =	Listed
P =	Proposed
F =	Final
S =	Secondary
MCLG =	Maximum Contaminant Level Goal

(a) Excludes pumping wells PW10, PW11, PW13, and PW15.
(b) Total Principal Organic Contaminants [POCs] (i.e., includes listed volatile organics and Unspecified Organic Contaminants [UOCs]) not to exceed 100 µg/l total.
(c) Reference: New York Public Supply Regulations, Part 5-1, 7/17/92.
(d) Reference:
(e) Combined concentration of iron and manganese shall not exceed 500 µg/l. Iron and manganese not to exceed 300 µg/l each.
(f) Water >20 mg/l sodium should not be used for drinking by people with severely restricted sodium diets.
Water >270 mg/l sodium should not be used for drinking by people with moderately restricted sodium diets.

TABLE 2-G

SUMMARY OF POTENTIAL GROUNDWATER CONTAMINANTS OF CONCERN[a]
NWIRP, BETHPAGE, NEW YORK

Contaminant of Concern	Risk-Based Concern	ARAR-Based Concern					
		Federal MCL/MCLG		New York State			
				MCL		Groundwater Quality Standard	
Volatile Organics							
Trichloroethene	X	X		X		X	
Toluene				X		X	
1,1-Dichloroethane	X			X		X	
1,2-Dichloroethene	X	X		X		X	
1,1,1-Trichloroethane	X	X		X		X	
Tetrachlorethene	X	X		X		X	
1,1-Dichloroethene	X			X		X	
Carbon Tetrachloride	X	X		X		X	
Xylenes				X		X	
Semi-Volatile Organics							
Bis(2-ethylhexyl phthalate)	X	X		X		X	
Inorganics	**Total**	**Total**	**Dissolved**	**Total**	**Dissolved**	**Total**	**Dissolved**
Arsenic	X					X	X
Cadmium	X	X	X	X	X	X	X
Chromium	X	X		X	X	X	X
Hexavalent Chromium	X	X		X	X	X	X
Copper						X	
Iron		X	X	X	X	X	X
Lead	X	X		X		X	
Manganese	X	X	X	X	X	X	X
Nickel	X						
Vanadium	X						
Cyanide	X	X	X			X	X
Sodium						X	X

(a) Listed contaminants exceed the CRDL/CRQL.

TABLE 2-P
PRELIMINARY FEDERAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
NWIRP, BETHPAGE, NEW YORK

ARAR Citation	Rationale for Use at NWIRP Site	Type of Requirement
CONTAMINANT-SPECIFIC		
Safe Drinking Water Act (42USC 300) - Maximum Contaminant Levels (MCLs) 40CFR 141.11-141.16 - Maximum Contaminant Level Goals (MCLGs) 40CFR 141.50-141.51	Applicable in developing remediation goals for the contaminated groundwater plume in accordance with SARA Section 121(d)(2)(A)(iii)	Applicable
Reference Doses (RfDs), EPA Office of Research and Development	To be considered (TBC) requirement in the public health assessment.	To Be Considered (TBC)
Carcinogenic Potency Factors, EPA Environmental Criteria and Assessment Office; EPA Carcinogen Assessment Group	To be considered (TBC) requirement in the public health assessment.	To Be Considered (TBC)
Health Advisories, EPA Office of Drinking Water	To be considered (TBC) requirement in the public health assessment.	To Be Considered (TBC)
Clean Water Act (33 USC 1251-1376), Federal Ambient Water Quality Criteria (AWQCS)(40 CFR 131)	AWQC may be considered for actions that involve groundwater treatment and/or discharges to surface water	To Be Considered (TBC)

TABLE 2-P (continued)
PRELIMINARY FEDERAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
NWIRP, BETHPAGE, NEW YORK
PAGE 2

ARAR Citation	Rationale for Use at NWIRP Site	Type of Requirement
CONTAMINANT-SPECIFIC (cont.)		
Clean Air Act (42 USC 7401) National Ambient Air Quality Standards (NAAQS)(40CFR Part 50)	NWIRP site alternatives may result in emission of unacceptable levels of airborne particulates to the atmosphere. The primary (and secondary standard) for particulate matter, expressed as PM-10) is 150 [24-hour, annual arithmetic mean] and 50 [1-year, annual arithmetic mean]	Applicable
Air Emissions for Non-Attainment Areas (OSWER Directive 9355.0-28)	Although not classified as a major source, remedial alternatives (e.g., air stripping) may result in air emissions to the atmosphere. The NWIRP site is in a NAAQS non-attainment area for ozone.	Relevant and appropriate
Clean Air Act (42 USC 7401) National Emissions Standards for Hazardous Air Pollutants (NESHAPs)(40CFR Part 61)	Standards are possibly, but not likely, to be relevant and appropriate since these standards were developed for specific, significant sources.	Potentially Relevant and Appropriate

TABLE 2-P (continued)
PRELIMINARY FEDERAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
NWIRP, BETHPAGE, NEW YORK

ARAR Citation	Rationale for Use at NWIRP Site	Type of Requirement
CONTAMINANT-SPECIFIC (cont.)		
Guidance on Remedial Actions for Superfund Sites with PCB Contamination (OSWER Directive No. 9355.4-01, August 1990)	The NWIRP site should qualify as an industrial area. Maximum site PCB soil concentration of 7.9 ppm (7,900 ug/kg) supports no action. Additionally, PCBs have not been detected in the groundwater.	To Be Considered (TBC)
EPA Polychlorinated Biphenyls Spill Policy (40 CFR Part 761; April 2, 1987)	The NWIRP site is in a restricted area, located within a fenced area with controlled access. Comparison of site concentrations with performance standards for new spills is warranted. Maximum site concentration of 7.9 ppm (ug/kg) supports no action. Note that the concentration of the original spill(s) is unknown.	To Be Considered (TBC)
LOCATION-SPECIFIC		
Groundwater Protection Strategy (EPA, 1984)	Groundwater beneath and downgradient of the NWIRP site is likely designated as Class 2.	To Be Considered (TBC)

TABLE 2-P (continued)
PRELIMINARY FEDERAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
NWIRP, BETHPAGE, NEW YORK
PAGE 4

ARAR Citation	Rationale for Use at NWIRP Site	Type of Requirement
ACTION-SPECIFIC		
General Pretreatment Regulations for Existing and New Sources of Pollutants (40 CFR Part 403)	Effluent from a groundwater treatment system for the NWIRP site may be discharged to a local Publicly Owned Treatment Works (POTW).	Potentially Applicable
Underground Injection Control Program (40 CFR Parts 144, 147)	Effluent from treatment of NWIRP groundwater may be reinjected (Class IV well) into the same formation from which it was withdrawn.	Potentially Applicable
Toxic Substances Control Act (40 CFR Part 761.6-761.79 Subpart D Storage and Disposal)	The concentration and source of the original spill(s) is unknown. Although soils concentration of PCBs are generally quite low, some soils technologies (e.g., solvent extraction, low temperature thermal stripping) may concentrate PCBs to 50 ppm or more.	Potentially Relevant and Appropriate
OSHA Requirements (29 CFR Parts 1910, 1926, and 1904)	Required for site workers during construction and operation of remedial activities.	Applicable
DOT Rules for Hazardous Materials Transport (40 CFR Parts 107, 171-179)	Remedial actions may include offsite treatment and disposal of soils or treatment residuals (e.g., offsite regeneration of activated carbon, offsite soils disposal), as well as samples analysis	Applicable

TABLE 2-P (continued)
PRELIMINARY FEDERAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
NWIRP, BETHPAGE, NEW YORK
PAGE 5

ARAR Citation	Rationale for Use at NWIRP Site	Type of Requirement
ACTION-SPECIFIC (cont.)		
Resource Conservation and Recovery Act of 1976 (Amended 1984) • Identification and Listing of Hazardous Waste (40 CFR Part 261)	The primary contaminants result from solvent use and plating operations. Although regulations for listed waste are not considered applicable because groundwater contaminant concentrations are much less than that of listed waste, some aspects related to listed hazardous wastes may be relevant and appropriate. Also, the site groundwater and/or soils could be considered hazardous by characteristic (TCLP leachate exceedance).	Relevant and Appropriate
• Land Disposal Restrictions (LDRs) (40 CFR Part 268)	Some treatment technologies will result in concentrated residuals which may be considered hazardous waste subject to land disposal restrictions.	Potentially Relevant and Appropriate
• Treatment, Storage, and Disposal of Hazardous Waste (40 CFR Parts 262-265, and 266)	During site restoration, waste generation, transport, and/or treatment, storage, and disposal activities may occur. Not an ARAR for reinjection of treated groundwater.	Potentially Relevant and Appropriate

TABLE 2-P (continued)
PRELIMINARY FEDERAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
NWIRP, BETHPAGE, NEW YORK
PAGE 6

PRELIMINARY

ARAR Citation	Rationale for Use at NWIRP Site	Type of Requirement
ACTION-SPECIFIC (cont.)		
Resource Conservation and Recovery Act of 1976 (cont.) • Corrective Action for Solid Waste Management Units at Hazardous Waste Management Facilities, Proposed Rule (40 CFR Parts 264, 265, 270 and 271)	Although the NWIRP site is a CERCLA and not a RCRA driven remediation, some of the guidance may abe useful in establishing remediation strategy.	To Be Considered (TBC)
Control of Air Emissions from Superfund Air Strippers at Superfund Groundwater Sites (OSWER Directive 9355.0-28)	Site restoration at the NWIRP site may include air stripping of groundwater. The NWIRP site is in a NAAQS non-attainment area for ozone.	To Be Considered (TBC)

TABLE 2-K
PRELIMINARY STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
NWIRP, BETHPAGE, NEW YORK

ARAR Citation	Rationale for Use at NWIRP Site	Type of Requirement
CONTAMINANT-SPECIFIC		
New York Water Classifications and Quality Standards (New York Codes, Rules, and Regulations, Title 6-Environmental Conservation, Chapter V-Resource Management Services, Part 609 and Chapter X-Division of Water Resources, Parts 700-704 [BNA 11/22/91]	Standards impact selection of groundwater plume remediation goals, as well as treatment goals for reinjection of treated effluent to the aquifer. According to Part 701, NWIRP site groundwater is classified as GA; a source of potable water supply. Part 702 allows more stringent groundwater effluent standards or limitations to be established where necessary to prevent pollution and protect the best usages of groundwaters. Part 703 includes groundwater quality standards for Class GA groundwater. Table 2-? provides available standards for site compounds. Additionally for GA groundwater, pH shall be between 6.5 and 8.5 and TDS shall not exceed 500 mg/l.	Applicable

TABLE 2-K (continued)
PRELIMINARY STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
NWIRP, BETHPAGE, NEW YORK

PRELIMINARY

ARAR Citation	Rationale for Use at NWIRP Site	Type of Requirement
CONTAMINANT-SPECIFIC (cont.)		
New York Public Water Supply Regulations (Codes, Rules and Regulations of the State of New York, Title 10-Health, Chapter I-State Sanitary Code, Part 5 Drinking Water Supplies, Subpart 5-1-Public Water Supplies) [BNA 7/17/92]	Drinking water standards impact selection of groundwater plume remediation goals, as well as treatment goals for reinjection of treated effluent to the aquifer.	Applicable
New York Ambient Air Quality Standards (Official Codes, Rules and Regulations of the State of New York, Title 6, Chapter III, Air Resources, Subchapter B, Part 256-Air Quality Classifications and Part 257 Air Quality Standards) [BNA 4/14/89]	The NWIRP site area is classified as Level ??- ??. Particulate and non-methane hydrocarbon standards will be applicable to the site.	Applicable
LOCATION-SPECIFIC		
No location-specific ARARs have been identified for the NWIRP site	----	----

TABLE 2-K (continued)
PRELIMINARY STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
NWIRP, BETHPAGE, NEW YORK

ARAR Citation	Rationale for Use at NWIRP Site	Type of Requirement
ACTION-SPECIFIC		
New York Environmental Conservation Law (New York Consolidated Laws Service; Article 17-Water Pollution Control, Article 37-Substances Hazardous or Acutely Hazardous to Public Health, Safety or the Environment, Article 71-Enforcement, and Article 72-Environmental Regulatory Program Fees [BNA 11/8/91]	Discharges to state groundwater are prohibited unless in compliance with all standards, criteria, limitation, rules and regulations.	Potentially Applicable
New York Water Classifications and Quality Standards (New York Codes, Rules, and Regulations, Title 6-Environmental Conservation, Chapter V-Resource Management Services, Part 609 and Chapter X-Division of Water Resources, Parts 700-704 [BNA 11/22/91]	Part 703- Surface Water and Groundwater Quality Standards and Groundwater Effluent Standards; Treated NWIRP groundwater will likely be reinjected to groundwater so will need to comply with Groundwater Effluent Standards (see Table 2-?). The NWIRP site is in Nassau County, so will additionally have to comply with a maximum concentration of 1,000 mg/l total dissolved solids (TDS) and 10 mg/l total nitrogen (as N)	Applicable

TABLE 2-K (continued)
PRELIMINARY STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
NWIRP, BETHPAGE, NEW YORK

PRELIMINARY

ARAR Citation	Rationale for Use at NWIRP Site	Type of Requirement
ACTION-SPECIFIC		
New York Regulations on State Pollutant Discharge Elimination System (New York Compilation of Rules and Regulations, Title 6-Environmental Conservation, Chapter X-Division of Water Resources, Parts 750 through 758) [BNA 10/16/87]	Although CERCLA site discharges are exempt from administrative requirements in obtaining a SPDES, technical requirements are relevant and appropriate.	Relevant and Appropriate
New York Solid and Hazardous Waste Management Laws (New York Consolidated Laws Service: Environmental Conservation Law, Article 27-Collection, Treatment and Disposal of Refuse and Other Solid Waste; Article 71-Enforcement, and Article 72-Environmental Regulatory Program Fees) [BNA 9/25/92]	Remedial activities may result in hazardous or nonhazardous solid waste. Sec.27-0704- Land burial and disposal in the Counties of Nassau and Suffolk; special provisions. No new landfills (or expansions to existing landfills) are allowed in a deep flow recharge area. In areas outside deep flow recharge areas numerous requirements are specified including the prohibition of hazardous waste; also, the landfill can only accept material which is the product of resource recovery, incineration or composting.	Potentially Applicable

TABLE 2-K (continued)
PRELIMINARY STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
NWIRP, BETHPAGE, NEW YORK

ARAR Citation	Rationale for Use at NWIRP Site	Type of Requirement
ACTION-SPECIFIC		
New York Rules for Siting Industrial Hazardous Waste Facilities (New York Compilation of Rules and Regulations, Title 6, Chapter 361) [BNA 4/7/89]	Although unlikely that a landfill would be constructed for soils or treatment residuals disposal, based on restrictions imposed by New York State solid waste and hazardous waste management laws, this ARAR will be retained.	Potentially Applicable
New York Waste Transport Permit Regulations (New York Compilation of Rules and Regulations, Title 6-Department of Environmental Conservation, Chapter 364) [BNA 12/20/91]	Offsite transport of contaminated soils or treatment residuals will require compliance with these regulations.	Applicable
New York General Hazardous Waste Management System Regulations (Codes, Rules and Regulations of the State of New York, Title 6, Chapter IV-Quality Services, Subchapter B, Solid Wastes, Part 370) [BNA 8/14/92]	Residuals from treatment could be considered as hazardous waste subject to these regulations.	Potentially Applicable.

TABLE 2-K (continued)
PRELIMINARY STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
NWIRP, BETHPAGE, NEW YORK

ARAR Citation	Rationale for Use at NWIRP Site	Type of Requirement
ACTION-SPECIFIC (cont.)		
New York Rules on Hazardous Waste Program Fees (New York Codes, Rules and Regulations, Title 6-Conservation, Chapter IV-Quality, Part 483 and 484) [10/11/91]	No hazardous waste program fees are payable related to cleanup, remediation, or corrective action activities. However, waste transporter program fees will be required for offsite disposal of wastes or treatment residuals.	Potentially Applicable
New York Identification and Listing of Hazardous Wastes Regulations (New York Compilation of Rules and Regulations, Title 6, Chapter 371) [9/25/92]	Treatment residuals could be hazardous waste by characteristic.	Potentially Applicable.
New York Hazardous Waste Manifest System Regulations (Codes, Rules and Regulations of the State of New York, Title 6, Chapter IV-Quality Services, Subchapter B-Solid Wastes, Part 372) [7/17/92]	Manifests will be required for offsite disposal/treatment of treatment residuals.	Potentially Applicable

TABLE 2-K (continued)
PRELIMINARY STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
NWIRP, BETHPAGE, NEW YORK

ARAR Citation	Rationale for Use at NWIRP Site	Type of Requirement
ACTION-SPECIFIC (cont.)		
New York Hazardous Waste Treatment, Storage and Disposal Facility Permitting Requirements (New York Compilation of Rules and Regulations, Title 6, Chapter 373-1) [8/14/92]	NWIRP site remediation activities, must meet the substantive technical permitting requirements.	Relevant and Appropriate
New York Final Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities (Codes, Rules and Regulations of the State of New York, Title 6-Department of Environmental Conservation, Chapter IV-Quality Services, Subchapter B, Subpart 373-2) [9/11/92]	Treatment and/or storage activities may take place on site.	Relevant and Appropriate
New York Interim Status Standards for Owners and Operators of Hazardous Waste Facilities (Codes, Rules and Regulations of the State of New York, Title 6-Department of Environmental Conservation, Chapter IV-Quality Services, Subchapter B, Subpart 373-3) [9/25/92]	Treatment and/or storage activities may take place on site.	Relevant and Appropriate

TABLE 2-K (continued)
PRELIMINARY STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
NWIRP, BETHPAGE, NEW YORK

ARAR Citation	Rationale for Use at NWIRP Site	Type of Requirement
ACTION-SPECIFIC (cont.)		
New York Standards for Managing Specific Hazardous Wastes and Hazardous Waste Management Facilities (Codes, Rules and Regulations of the State of New York, Title 6, Chapter IV-Quality Services, Subchapter B-Solid Wastes, Part 374) [7/31/92]	Although unlikely, NWIRP site remedial alternatives may include recovery.	Potentially Relevant and Appropriate
New York Rules for Inactive Hazardous Waste Disposal Sites (Codes, Rules and Regulation of the State of New York, Title 6-Department of Environmental Conservation, Chapter IV-Quality Services, Subchapter B, Part 375) [10/9/92]	State review and concurrence with the selected remediation scheme will be required. 375-1.10 Remedy Selection; Federal "standards and criteria" and "guidance" are considered to the extent that they are more stringent than those of the state. The hierarchy of preferred remedial technologies is as follows: ● Destruction ● Separation/treatment ● Solidification/chemical fixation ● Control and isolation	Applicable

TABLE 2-K (continued)
PRELIMINARY STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
NWIRP, BETHPAGE, NEW YORK

PRELIMINARY

ARAR Citation	Rationale for Use at NWIRP Site	Type of Requirement
ACTION-SPECIFIC		
New York Land Disposal Restrictions Regulations (Codes, Rules and Regulations of the State of New York, Title 6-Department of Environmental Conservation Chapter IV-Quality Services, Subchapter B, Subpart 376) [9/25/92]	Contaminated soil and/or treatment residuals will be subject to land disposal restrictions if hazardous by characteristic	Potentially Applicable
New York Environmental conservation Law (New York Consolidated Laws Service: Environmental Conservation Law, Article 1-General Provisions, Article 3-Department of Environmental Conservation, Article 5-State Environmental Board, Article 7-Council of Environmental Advisers, Article 8-Environmental Quality Review, Article 19-Air Pollution Control, Article 38-Chlorofluorocarbon Compounds, Article 70-Uniform Procedures, Article 71-Enforcement and Article 72-Environmental Regulatory Program Fees [9/11/92]	Remedial activities must be in compliance with state law.	Applicable

TABLE 2-K (continued)
PRELIMINARY STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
NWIRP, BETHPAGE, NEW YORK

ARAR Citation	Rationale for Use at NWIRP Site	Type of Requirement
ACTION-SPECIFIC (cont.)		
New York Air Pollution Control Regulations: Parts 200-254 (Codes, Rules and Regulations of the State of New York, Title 6, Chapter III-Air Resources, Subchapter A)	Remedial activities (e.g., air stripping, excavation, vacuum extraction) may adversely impact air quality	Potentially Relevant and Appropriate

under Federal or state law that directly and fully address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site.

- Relevant and Appropriate Requirements means those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or state law, while not "applicable" address problems or situations sufficiently similar (relevant) to those encountered at the CERCLA site, that their use is well suited (appropriate) to the particular site.

- "To Be Considered" (TBC) Criteria are non-promulgated, non-enforceable guidelines or criteria that may be useful for developing remedial action, or necessary for determining what is protective to human health and/or the environment. Examples of TBC criteria include EPA Drinking Water Health Advisories, Carcinogenic Potency Factors, and Reference Doses.

Section 121(d)(4) of CERCLA allows the selection of a remedial alternative that will not attain all ARARs if any of six conditions for a waiver of ARARs exist. These conditions are as follows: (1) the remedial action is an interim measure whereby the final remedy will attain the ARAR upon completion; (2) compliance will result in greater risk to human health and the environment than other options; (3) compliance is technically impracticable; (4) an alternative remedial action will attain the equivalent of the ARAR; (5) for state requirements, the state has not consistently applied the requirement in similar circumstances; or (6) compliance with the ARAR will not provide a balance between protecting public health, welfare, and the environment at the facility with the availability of Fund money for response at other facilities (fund balancing).

ARARS fall into three categories, based on the manner in which they are applied. The characterization of these categories is not perfect, as many requirements are combinations of the three types of ARARs. These categories are as follows:

- Contaminant Specific: Health-/risk-based numerical values or methodologies that establish concentration or discharge limits for particular contaminants. Examples of

contaminant-specific ARARs include MCLs and Clean Water Act (CWA) water quality criteria. Contaminant-specific ARARs govern the extent of site cleanup.

- Location Specific: Restrictions based on the concentration of hazardous substances or the conduct of activities in specific locations. These may restrict or preclude certain remedial actions or may apply only to certain portions of site. Examples of location-specific ARARs include RCRA location requirements and floodplain management requirements. Location-specific ARARs pertain to special site features.

- Action Specific: Technology- or activity-based controls or restrictions on activities related to management of hazardous waste. Action-specific ARARs pertain to implementing a given remedy.

2.2.2.1 Contaminant-Specific ARARs and TBCs

This section presents a summary of Federal and state contaminant-specific ARARs and TBC criteria. All ARARs and TBC criteria provide some medium-specific guidance on "acceptable" or "permissible" concentrations of contaminants.

The Safe Drinking Water Act (SDWA) promulgated National Primary Drinking Water Standard MCLs (40 CFR Part 141). Maximum Contaminant Levels (MCLs) are enforceable standards for contaminants in public drinking water supply systems. They consider not only health factors but also the economic and technical feasibility of removing a contaminant from a water supply system. Secondary MCLs (40 CFR Part 143) are not enforceable but are intended as guidelines for contaminants that may adversely affect the aesthetic quality of drinking water, such as taste, odor, color, and appearance, and may deter public acceptance of drinking water provided by public water systems.

The SDWA also established Maximum Contaminant Level Goals (MCLGs) for several organic and inorganic compounds in drinking water. The National Contingency Plan (NCP) (40 CFR Part 300.430(e)(2)(i) states that MCLGs, if set at levels above zero, shall be attained by remedial actions for groundwaters or surface waters that are current or potential sources of drinking water, where the MCLGs are relevant and appropriate under the circumstances of the release. If an MCLG is found not

to be relevant and appropriate, the corresponding MCL shall be achieved where relevant and appropriate to the circumstances of the release. For MCLGs that are set at zero, the MCL promulgated for that contaminant under the SDWA shall be attained by the remedial actions. In cases involving multiple contaminants or pathways where attainment of chemical-specific ARARs will result in a cumulative cancer risk in excess of 10^{-4}, criteria in paragraph (e)(2)(i)(A) of Section 300.430 (i.e., risk-based criteria) may be considered when determining the cleanup level to be attained.

Table 2-F (and Table 2-2) provides Federal SDWA requirements that may be applicable to remedial actions involving groundwater.

EPA Health Advisories are nonenforceable guidelines (TBCs) developed by the EPA Office of Drinking Water for chemicals that may be intermittently encountered in public water supply systems. Health advisories are available for short-term, longer-term, and lifetime exposures for a 10-kg child and/or a 70-kg adult. Health advisories may be pertinent for remedial actions involving groundwater, especially for contaminants that are not regulated under the SDWA.

The Clean Water Act (CWA) sets EPA Ambient Water Quality Criteria (AWQCs) that are non-enforceable guidelines developed for pollutants in surface waters pursuant to Section 304(a)(l) of the Clean Water Act. Although AWQCs are not legally enforceable, they have been used by many states to develop enforceable water quality standards; they should be considered as potential ARARs, as specified by CERCLA. AWQCs are available for the protection of human health from exposure to contaminants in drinking water as well as from ingestion of aquatic biota and for the protection of freshwater and saltwater aquatic life. AWQCs may be considered for actions that involve groundwater treatment and/or discharge to nearby surface waters.

Table 2-2 provides Federal AWQC requirements that may be applicable to remedial actions involving groundwater.

Reference Dose (RfD), as defined in the EPA Integrated Risk Information System (IRIS), is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. RfDs are developed for chronic and/or subchronic human exposure to hazardous chemicals

TABLE 2-2

STANDARDS, GUIDELINES, AND DOSE-RESPONSE PARAMETERS FOR CHEMICALS OF CONCERN
NWIRP, BETHPAGE, NY

Compound	CSF[1] (mg/kg/day)$^{-1}$		Chronic RFD[1] (mg/kg/day)		MCL/NPDWR (ug/L) MCLG (2)(3)(4)(5)(6) (7)(8)	DWHA (ug/L)	AWQC (ug/L)[9]			NYS[10] MCL (ug/L)
	Inhalation	Oral	Inhalation	Oral			Aquatic Life	Drinking Water & Fish	Fish Only	
Trichloroethene	1.7E-2 B2	1.1E-2 B2			5 G:0	-	21900(L)	2.7	80.7	5
Tetrachloroethene	1.8E-3 B2	5.1E-2 B2		1E-2	5 G:0	1-day child - 2000 10-day child - 2000 Longer term child - 1000 Longer term adult - 5000	840(L)	0.8	8.85	5
Chloroform	8.1E-2 B2	6.1E-3 B2		1E-2	100	1-day child - 4000 10-day child - 4000 Longer term child-100 Longer term adult-500	1240(L)	0.19	15.7	100 (total THM)
Toluene			6E-1	2E-1	1000 G:1000	1-day child - 20000 10-day child - 2000 Longer term child-2000 Longer term adult - 7000 Lifetime adult - 1000	17500(fa) (L)	14300	424000	5
4-Methylphenol	C	C		5E-2	-					50
bis(2-chloroethyl)ether	1.1 B2	1.1 B2			-					5
DDT	3.4E-1 B2	3.4E-1 B2		5E-4	-		0.001	0.000024	0.000024	50
Chlordane	1.3 B2	1.3 B2		6E-5	2 G:0	1-day child - 60 10-day child - 60	0.0043	0.00046	0.00048	50
Aroclor 1248	B2	7.7 B2			0.5 (PCBs) G:0		0.014 (PCBs)	0.000079 (PCBs)	0.000079 (PCBs)	50
Aroclor 1254	B2	7.7 B2			0.5 (PCBs) G:0		0.014 (PCBs)	0.000079 (PCBs)	0.000079 (PCBs)	50
bis(2-ethylhexyl)phthalate	B2	1.4E-2 B2		2E-2	4(P) G:0		3(L) (phthal) 360(P)	15000	5000	50
Butyl benzyl phthalate		C		2E-1	100 (P)		3(L) (phthal)			50
Di-n-butyl phthalate				1E-1	-		3(L) (phthal)	35000	154000	50

STANDARDS, GUIDELINES, AND DOSE-RESPONSE PARAMETERS FOR INDICATOR CHEMICALS
PAGE TWO

Compound	CSF[1] (mg/kg/day)$^{-1}$		Chronic RFD[1] (mg/kg/day)		MCL/NPRWR MCLG(ug/L) (1)(2)(3)(4)(5) (6)(7)(8)	DWHA (ug/L)	AWQC (ug/L)			NYS MCL (ug/L)
	Inhalation	Oral	Inhalation	Oral			Aquatic Life	Drinking Water & Fish	Fish Only	
Dimethyl phthalate				1E0	-	-	3(L) (phthal)	313000	2900000	50
Naphthalene				4E-3	-	1-day child - 500 10-day child - 500 Longer term child - 400 Longer term adult - 1000 Lifetime adult - 20	620(L)			50
Acenaphthene				6E-2	-		520(L)			50
Anthracene				3E-1	-		300(ma) (L)(PAHs)	0.0028 (PAHs)	0.0311 (PAHs)	50
Fluoranthene				4E-2	-		3980(fa)(L)	42	54	50
Pyrene				3E-2	-		300(ma) (L)(PAHs)	0.0028(PAHs)	0.0311 (PAHs)	50
Benzo[a]anthracene	8.845E-1 B2	1.6675 B2			0.1(P) G:0		300(ma) (L)(PAHs)	0.0028(PAHs)	0.0311 (PAHs)	50
Chrysene	2.684E-2 B2	5.06E-2 B2			0.2(P) G:0		300(ma) (L)(PAHs)	0.0028(PAHs)	0.0311 (PAHs)	50
Benzo[b]fluoranthene	8.54E-1 B2	1.61 B2			0.2(P) G:0		300(ma) (L)(PAHs)	0.0028(PAHs)	0.0311 (PAHs)	50
Benzo[k]fluoranthene	4.026E-1 B2	7.59E-1 B2			0.2(P) G:0		300(ma) (L)(PAHs)	0.0028(PAHs)	0.0311 (PAHs)	50
Benzo[a]pyrene	6.1 B2	1.15E1 B2			0.2(P) G:0		300(ma) (L)(PAHs)	0.0028(PAHs)	0.0311 (PAHs)	50
Indeno[1,2,3,-c,d]pyrene	1.4152 B2	2.668 B2			0.4(P)		3(ma) (L)(PAHs)	0.0028(PAHs)	0.0311 (PAHs)	50

TABLE 2-2
STANDARDS, GUIDELINES, AND DOSE-RESPONSE PARAMETERS FOR INDICATOR CHEMICALS
PAGE THREE

PRELIMINARY

Compound	CSF[1] (mg/kg/day)$^{-1}$		Chronic RFD[1] (mg/kg/day)		MCL/NPDWR MCLG (ug/L) (2)(3)(4)(5)(6)(7)(8)	DWHA (ug/L)	AWQC (ug/L)			NYS MCL (ug/L)
	Inhalation	Oral	Inhalation	Oral			Aquatic Life	Drinking Water & Fish	Fish Only	
Dibenzo[a,h]anthracene	6.771 B2	1.2765E1 B2			0.3(P) G:0		300(ma) (L)(PAHs)	0.0028(PAHs)	0.0311 (PAHs)	50
Benzo[g,h,i]perylene					-		300(ma) (L)(PAHs)	0.0028(PAHs)	0.0311 (PAHs)	50
Fluorene				4E-2	-		300(ma) (L)(PAHs)	0.0028(PAHs)	0.0311 (PAHs)	50
trans1,2-Dichloroethene				2E-2	100 G:100 70(cis) G:70(cis)	1-day child - 20000 10-day child - 2000 Longer term child-2000 Longer term adult - 6000 Lifetime adult - 100	11600 (L)(fa)	0.033	1.85	5
1,1-Trichloroethane			3E-1	9E-2	200 G:200	1-day child - 100000 10-day child - 40000 Longer term child - 40000 Longer term adult - 100000 Lifetime adult - 200	31200(ma) (L)	18400	1030000	5
Carbon disulfide			3E-3	1E-1	-					50
Arsenic	5E1 A	A		1E-3	50(N) G:0		V - 48(L) III-190	0.0022	0.0175	50
Antimony				4E-4	10/5(P) G:3	1-day child - 15 10-day child - 15 Longer term adult - 15 Lifetime adult - 3	1600(L) 30(P)	146	45000	-
Barium			1E-4	5E-2	1000(N) 2000(F) G:2000	Lifetime adult - 2000	1000			1000
Beryllium	8.4 B2	4.3 B2		5E-3	1(P) G:0	1-day child - 30000 10-day child 30000 Longer term child - 4000 Longer term adult - 20000	5.3(L)	0.0068	0.117	-
Cadmium	6.1 B1			5E-4	10(N);5(F) G:5	1-day child - 40 10-day child - 40 Longer term child - 5 Longer term adult - 20 Lifetime adult - 5	1.1 (+)	10	-	10

TABLE 2-2
STANDARDS, GUIDELINES, AND DOSE-RESPONSE PARAMETERS FOR INDICATOR CHEMICALS
PAGE FOUR

Compound	CSF $(mg/kg/day)^{-1}$		Chronic RFD (mg/kg/day)		MCL/NPDWR MCLG (ug/L)	DWHA (ug/L)	AWQC (ug/L)			NYS MCL (ug/L)
	Inhalation	Oral	Inhalation	Oral			Aquatic Life	Drinking Water & Fish	Fish Only	
Chromium	VI-4.1E1 A		III-6E-7 VI-6E-7	III-1E0 VI-5E-3	50(N);100(F) G:100	1-day child - 1000 10-day child - 1000 Longer term child - 200 Longer term adult - 800 Lifetime adult - 100	VI-11 III-210(+)	VI-50 III-170000	III- 3433000	50
Copper				4E-2	1300(A) G:1300		12(+)			1000(S)
Lead	B2	B2	4.3E-4	1.4E-3	50(N);15(A) G:0		3.2(+)	50		50
Manganese			1E-4	1E-1	50(S)			50	100	300(S)
Mercury			9E-5	3E-4	2 G:2	Longer term adult - 2 Lifetime adult - 2	0.012	0.144	0.146	2
Nickel	8.4E-1 A			2E-2	100(P) G:100	1-day child - 1000 10-day child - 1000 Longer term child -100 Longer term adult - 600 Lifetime adult - 100	160(+)	13.4	100	-
Silver				3E-3	50(N)	1-day child - 200 10-day child - 200 Longer term child - 200 Longer term adult - 200 Lifetime adult - 100	0.12	50		50
Vanadium				7E-3	-	1-day child - 80 10-day child - 80 Longer term child - 30 Longer term adult - 110 Lifetime adult - 20				-
Zinc				2E-1	5000(s)	1-day child - 4000 10-day child - 4000 Longer term child - 2000 Longer term adult - 9000 Lifetime adult - 2000	110(+)			5000(S)
Cyanide				2E-2	200(P) G:200	1-day child - 200 10-day child - 200 Longer term child - 200 Longerterm adult - 800 Lifetime adult - 200	5.2	200		-

TABLE 2-2
STANDARDS, GUIDELINES, AND DOS-RESPONSE PARAMETERS FOR INDICATOR CHEMICALS
PAGE FIVE

Compound	CSF (mg/kg/day)$^{-1}$		Chronic RFD (mg/kg/day)		MCL/NPDWR MCLG (ug/L)	DWHA (ug/L)	AWQC (ug/L)			NYS MCL (ug/L)
	Inhalation	Oral	Inhalation	Oral			Aquatic Life	Drinking Water & Fish	Fish Only	
1,1-Dichloroethane			1E-1	1E-1	-					5
1,1-Dichloroethene	1.2 C	6E-1 C		9E-3	7 G:7	1-day child - 2000 10-day child - 1000 Longer term child - 1000 Longer term adult - 4000 Lifetime adult - 7	11600(fa) (L)	0.033	1.85	5
Carbon Tetrachloride	1.3E-1 B2	1.3E-1 B2		7E-4	5 G:0	1-day child - 4000 10-day child - 200 Longer term child - 70 Longer term adult - 300	35200(fa) (L)	0.4	6.94	5
Ethylbenzene			3E-1	1E-1	700 G:700	1-day child - 40000 10-day child - 3000 Longer term child - 1000 Longer term adult - 3000 Lifetime adult - 700	32000 (fa) (L)	1400	3260	5
Xylenes			9E-2	2	10000 G:700	1-day child - 40000 10-day child - 40000 Longer term child - 40000 Longer term adult - 100000 Lifetime adult - 10000				5
Di-n-octyl phthalate				2E-2	-		3(L) (phthal)			50
Phenanthrene				2.9E-2			300(ma)(L) (PAHs)	0.002.8(PAHs)	0.0311	50
2-Methylphenol				5E-2	-					50
2,4-Dimethylphenol				2E-2	-		2120(fa) (L)			50
Selenium					50(F);10(N) G:50		5			10
Thallium				7E-5	2/1(P) G:0.5	1-day child - 7 10-day child - 7 Longer term child - 7 Longer term adult - 20 Lifetime adult - 0.4	40(L)	13	48	-

TABLE 2-2
STANDARDS, GUIDELINES, AND DOS-RESPONSE PARAMETERS FOR INDICATOR CHEMICALS
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PRELIMINARY

CSF = Cancer slope factor
RFD = Risk reference dose
G = MCLG = MCL Goal
MCL = Maximum contaminant level
N = NPDWR = National Primary Drinking Water Regulation
P = Proposed
DWHA = Drinking Water Health Advisory
S = Secondary MCL
AWQC = Ambient Water Quality Criterion (Chronic freshwater unless otherwise indicated)
NYS = New York State
L = Lowest observed effects level
fa = Freshwater acute
PCBs = Based on polychlorinated biphenyls
Phthal = Based on total phthalates
THM = Trihalomethanes
A = Cancer weight of evidence A (human carcinogen)
B1 = Cancer weight of evidence B1 (probable human carcinogen)
B2 = Cancer weight of evidence B2 (probable human carcinogen)
C = Cancer weight of evidence C (possible human carcinogen)
PAHs = Polycyclic aromatic hydrocarbons
Ms = Marine acute
F = Final
\+ = Hardness - dependent
A = Action Level

(1) USEPA, January 1991
(2) USEPA, January 30, 1991
(3) USEPA, April 1991
(4) USEPA, July 1990
(5) USEPA, July 25, 1990
(6) USEPA, July 1, 1991
(7) USEPA, June 7, 1991
(8) UESPA, July 18, 1991
(9) USEPA, 1987
(10)New York State Sanitary Code, July 3, 1991

and are based on the assumption that thresholds exist for certain toxic effects. The RfD is usually expressed as an acceptable dose (mg) per unit body weight (kg) per unit time (day). The RfD is derived by dividing the no-observed-adverse effect level (NOAEL) or the lowest-observed-adverse effect level (LOAEL) by an uncertainty factor (UF) times a modifying factor (MF). The use of uncertainty factors and modifying factors is discussed in the EPA, Office of Research and Development (ORD) Health Effects Assessment Summary Tables, Fourth Quarter FY1989 [October 1989-ORD(RD-689)] (EPA, 1989a).

Table 2-2 provides RfDs that may be considered in establishing remediation goals.

Cancer Slope Factors (CSFs) are used for estimating the lifetime probability (assumed 70-year lifespan) of human receptors contracting cancer as a result of exposure to known or suspected carcinogens. These factors are generally reported in units of kg-day/mg and are derived through an assumed low dosage linear relationship and an extrapolation from high to low dose responses determined from human or animal studies. Cancer risk and CSFs are most commonly estimated through the use of a linearized multistage mathematical extrapolation model applied to animal bioassay results. The value used in reporting the slope factor is the upper 95 percent confidence limit.

Table 2-2 provides CSFs that may be considered in establishing remediation goals.

The Clean Air Act (CAA) (42 USC 7401) consists of three programs or requirements that may be ARARs: National Ambient Air Quality Standards (NAAQS) (40 CFR Part 50), National Emissions Standards for Hazardous Air Pollutants (NESHAPs) (40 CFR Part 61), and NSPS (40 CFR Part 60).

NESHAPs are emission standards for source types (i.e., industrial categories) that emit hazardous air pollutants, and include significant sources of beryllium, vinyl chloride, benzene, asbestos, wet dust particulates, and other hazardous substances.

EPA requires the attainment and maintenance of primary and secondary NAAQS to protect public health and public welfare, respectively. NAAQS are available for six criteria pollutants (carbon monoxide, lead, nitrogen oxides, ozone, sulfur dioxide and airborne particulates). These standards are not source specific but rather are national limitations on ambient air quality. The sources of the contaminant and the routes

of exposure were considered. However, the standards do not consider costs for achievement or feasibility. States are responsible for assuring compliance with the NAAQS. Requirements in an EPA-approved State Implementation Plan (SIP) for the implementation, maintenance, and enforcement of NAAQS are potential ARARs.

NSPS are established for new sources of air emissions to ensure that the new stationary sources minimize emissions. These standards are for categories of stationary sources that cause or contribute to air pollution that may endanger public health or welfare. Standards are based upon the best demonstrated technology (BDT). NSPS are generally not applicable to CERCLA remedial actions but may be relevant and appropriate if the pollutant(s) emitted (e.g., from an air stripping tower) and the technology employed during the cleanup action are sufficiently similar to the pollutant and source category regulated by an NSPS and are well suited to the circumstances at the site. Also, OSWER Directive 9355.0-28 Air Emissions for Non-Attainment Areas requires new major stationary sources of air emissions to determine whether the source is in a NAAQS attainment or non-attainment area.

OSWER Directive 9355.0-28 is a TBC that guides the control of air emissions from air strippers at Superfund groundwater remediation sites. For sites located in areas that are not attaining the NAAQS for ozone, add-on emission controls are required for an air stripper with an actual emission rate in excess of 3 pounds per hour or 15 pounds per day, or a potential (i.e., calculated) rate of 10 tons per year of total volatile organic compounds.

EPA Polychlorinated Biphenyls Spill Policy (40 CFR Part 761) applies to recent spills of materials exceeding 50 ppm PCBs within 24 hours of occurrence. Effective May 1987, requires cleanup of PCB spills to different levels depending on spill location, the potential for exposure to residual PCBs remaining after cleanup, the concentration of PCBs initially spilled and the nature and size of the population potentially at risk of exposure. The policy addresses reporting, cleanup, performance standards, post-cleanup sampling, and recordkeeping. Generally the cleanup performance standard is 25 ppm for restricted areas and 10 ppm (with a minimum 10 inch depth to be excavated) for nonrestricted access areas. For old spills, requirements are to be established at the discretion of the EPA, usually through the regional offices. This is also true for special cases (i.e. spills directly into surface water, sewers, drinking water, grazing lands, and vegetable gardens).

OSWER Directive No. 9355.4-01 provides guidance on remedial actions for Superfund sites with PCB contamination. For contaminated soils, provides preliminary PCB remediation goals of 1 ppm for residential areas and 10 to 25 ppm for industrial areas. Treatment is recommended when PCBs exceed principal threat concentrations of 100 ppm for residential areas and 500 ppm for industrial areas; between these levels and the cleanup goals, the guidance suggests that various containment or exposure reduction strategies will be sufficient. The concentrations given are based on actual soil concentrations, unlike TSCA regulations which are based on the concentration of the original spill.

For contaminated groundwater, the guidance recommends remediation goals of 0.5 ug/l (i.e., the Federal MCL). Generally, PCB soil cleanup levels should provide sufficient protection unless groundwater is shallow, oily compounds are present, or the unsaturated zone has a very low TOC level.

New York Water Classifications and Quality Standards (New York Codes, Rules, and Regulations, Title 6-Environmental Conservation) regulates reclassification of water based on use and value, including protection and propagation of fish, shellfish and wildlife, recreation in and on the water, public water supplies, and agricultural, industrial and other purposes including navigation. Additionally, regulates the discharge of sewage, industrial waste or other wastes so as not to cause impairment of the best usages of the receiving water as specified by the water classifications at the location of discharge that may be affected by such discharge. Both quantitative standards as well as narrative water quality standards (turbidity, solids, oil, etc.) are provided. (See Action Specific ARARs for Groundwater Effluent Standards which would be applicable for alternatives including reinjection to the aquifer).

Groundwater quality standards (Class GA) for NWIRP site compounds are provided in Table 2-X. Also for GA groundwater, pH shall be between 6.5 and 8.5 and TDS shall not exceed 500 mg/l.

New York Public Water Supply Regulations (Codes, Rules and Regulations of the State of New York, Title 10-Health) provides requirements for state public water supplies.

Refer to Table 2-F for standards applying to NWIRP site compounds.

New York Ambient Air Quality Standards (Official Codes, Rules and Regulations of the State of New York, Title 6-Environmental Conservation) provides four general classifications of social and economic

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TABLE 2-X

STANDARDS FOR DISCHARGE TO GROUNDWATER
NWIRP, BETHPAGE, NEW YORK

COMPOUND	NEW YORK STATE GROUNDWATER EFFLUENT STANDARDS
VOLATILE ORGANICS	
Carbon Tetrachloride	5
1,1-Dichloroethane	---
1,1-Dichloroethene	---
1,2-Dichloroethene	---
Ethylbenzene	---
Tetrachlorethene	---
Toluene	---
1,1,1-Trichloroethane	---
Trichloroethene	10
Xylenes	---
SEMI-VOLATILE ORGANICS	
Bis(2-ethylhexyl)phthalate	4,200
Di-n-octyl phthalate	---
Phenols	2
Naphthalene	---
Acenaphthylene	---
Fluoranthene	---
Pyrene	---
Benzo[b]fluoranthene	---
PCBs	
PCB-1248	0.1
INORGANICS	
Aluminum	2,000
Arsenic	50
Barium	2,000

TABLE 2-X (continued)
STANDARDS FOR DISCHARGE TO GROUNDWATER
NWIRP, BETHPAGE, NEW YORK
PAGE 2

COMPOUND	NEW YORK STATE GROUNDWATER EFFLUENT STANDARDS
Beryllium	---
Cadmium	20
Calcium	---
Chromium	---
Hexavalent Chromium	100
Cobalt	---
Copper	1,000
Iron	600 [a]
Lead	50
Magnesium	---
Manganese	600 [a]
Mercury	4
Nickel	2,000
Potassium	---
Selenium	40
Sodium	---
Thallium	---
Vanadium	---
Zinc	5,000
Cyanide	400
OTHER	
Total Dissolved Solids (TDS)	1,000 mg/l
pH	6.5-8.5 or natural pH
Nitrogen (as N)	10 mg/l

[a] Combined concentration of iron and manganese shall not exceed 1,000 ug/l

development and resulting pollution potential upon which standards are based and establishes air quality standards to provide protection from adverse health effects of air contamination and protect and conserve natural resources and the environment. Regulates sulfur dioxide, particulates, carbon monoxide, photochemical oxidants, non-methane hydrocarbons, nitrogen dioxide, fluorides, beryllium, and hydrogen sulfide.

2.2.2.2 Location-Specific ARARs and TBCs

Other than EPA's Groundwater Protection Strategy, no location-specific ARARs or TBCs apply to the NWIRP site. As stated in the Final Remedial Investigation Report (HALLIBURTON NUS 1992) no natural aquatic habitats, no Federal or state endangered species, and no critical habitats are reported to exist on site. Moreover, no impacted floodplains or wetlands have been identified.

EPA's Groundwater Protection Strategy (EPA, 1984) policy is to protect groundwater for its highest present or potential beneficial use. This policy (TBC) will be incorporated into future regulatory amendments. The strategy designates three categories of groundwater:

- Class I - Special Groundwaters: Waters that are highly vulnerable to contamination and are either irreplaceable or ecologically vital sources of drinking water.

- Class II - Current and Potential Sources of Drinking Water and Waters Having Other Beneficial Uses: Waters that are currently used or that are potentially available.

- Class III - Groundwater Not a Potential Source of Drinking Water and of Limited Beneficial Use. Class III groundwater units are further subdivided into two subclasses.

    - Subclass IIIA includes groundwater units that are highly to intermediately interconnected to adjacent groundwater units of a higher class and/or surface waters. They may, as a result, be contributing to the degradation of the adjacent waters. They may be managed at a similar level as Class II groundwaters, depending upon the potential for producing adverse effects on the quality of adjacent waters.

- Subclass IIIB is restricted to groundwater characterized by a low degree of interconnection to adjacent surface waters or other groundwater units of a higher class within the Classification Review Area. These groundwaters are naturally isolated from sources of drinking waters in such a way that there is little potential for producing adverse effects on quality. They have low resource values outside of mining or waste disposal.

2.2.2.3 Action-Specific ARARs and TBCs

ARARs associated with discharge to surface water are not included in this section since no surface water bodies exist near the site.

RCRA Subtitle C regulates the treatment, storage, and disposal of hazardous waste from its generation until its ultimate disposal. In general, RCRA Subtitle C requirements for the treatment, storage, or disposal of hazardous waste will be applicable if

- The waste is a listed or characteristic waste under RCRA.
- The waste was treated, stored, or disposed (as defined in 40 CFR 260.10) after the effective date of the RCRA requirements under consideration.
- The activity at the CERCLA site constitutes current treatment, storage, or disposal as defined by RCRA.

RCRA Subtitle C requirements may be relevant and appropriate when the waste is sufficiently similar to a hazardous waste and/or the onsite remedial action constitutes treatment, storage, or disposal, and the particular RCRA requirement is well suited to the circumstances of the contaminant release and site. RCRA Subtitle C requirements may also be relevant and appropriate when the remedial action constitutes generation of a hazardous waste. Onsite activities, mandated by a Federally ordered Superfund cleanup, must comply with the substantive requirements of RCRA Subtitle C but not with the administrative requirements (i.e., permits) of RCRA. All RCRA Subtitle C requirements must be met if the cleanup is not under Federal order and/or when the hazardous waste moves off site.

The following requirements included in the RCRA Subtitle C regulations may pertain to the NWIRP sites:

- Hazardous waste generator requirements (40 CFR Part 262).
- Transportation requirements (40 CFR Part 263).
- Standards for owners and operators of hazardous waste TSD facilities (40 CFR Part 264).
- Interim status standards for owners and operators of hazardous waste TSD facilities (40 CFR Part 265).
- Land Disposal Restrictions (40 CFR Part 268)

A generator that treats, stores, or disposes of hazardous waste on site must comply with RCRA Standards Applicable to Generators of Hazardous Waste (40 CFR Part 262). These standards include manifest requirements, pre-transport requirements (i.e., packaging, labeling, placarding), recordkeeping, and reporting hazardous waste.

Standards Applicable to Transporters of Hazardous Waste (40 CFR Part 263) are applicable to offsite transportation of hazardous waste. These regulations include requirements for compliance with the manifest and recordkeeping systems and requirements for immediate action and cleanup of hazardous waste discharges (spills) during transportation.

Standards for Owners and Operators of Hazardous Waste TSD Facilities (40 CFR Part 264) are applicable to remedial actions and to offsite facilities receiving hazardous waste from the site for treatment and/or disposal and have a RCRA Part B permit. Onsite facilities must also have a RCRA Part B permit if the site is not a Federally ordered CERCLA cleanup. Standards for TSDFs include requirements for preparedness and prevention, releases from solid waste management units (i.e., corrective action requirements), closure and post-closure care, use and management of containers, and design and operating standards for tank systems, surface impoundments, waste piles, landfills, and incinerators.

RCRA Land Disposal Restrictions (LDR) Requirements (40 CFR Part 268) restrict certain wastes from being placed or disposed on the land unless they meet specific Best Demonstrated Available Technology (BDAT) treatment standards (expressed as concentrations, total or in the TCLP extract, or as specified technologies). Removal and treatment of a RCRA hazardous waste or movement of the waste out of the Area of Contamination (AOC), thereby constituting "placement," will trigger the LDR requirements.

Placement of hazardous waste into underground injection wells constitutes "land disposal" under the LDRs. Furthermore, RCRA Section 3020(a) bans hazardous waste disposal by underground injection into or above an underground source of drinking water. RCRA Section 3020(b), however, exempts from the ban all reinjections of treated contaminated groundwater into such formations undertaken as part of a CERCLA Section 104 or 106 response action, or a RCRA corrective action, if the following conditions are met:

- The contaminated groundwater is treated to substantially reduce hazardous constituents prior to such injection.

- The response action or corrective action is sufficient to protect human health and the environment upon completion.

RCRA Corrective Action for Solid Waste Management Units at Hazardous Waste Management Facilities; Proposed Rule (40 CFR Parts 264, 265, 270, and 271) proposes a Superfund-like program for cleaning up hazardous waste treatment, storage, and disposal facilities regulated under RCRA. The proposed rule provides greater flexibility than Superfund, particularly in the use of interim remedies and in setting action levels based on use. Additionally, facility investigation and other analyses will be streamlined to focus on plausible concerns and likely remedies, and to expedite cleanup decisions. Proposed cleanup goals for groundwater consist of MCLs (or limits within a protective range when MCLs are not available) where potentially drinkable groundwater is present. Otherwise, alternative levels protective of the environment could be established. For soils, cleanup levels would be established consistent with plausible future use.

DOT Rules for Hazardous Materials Transport (49 CFR Parts 107 and 171-179) regulate the transport of hazardous materials, including packaging, shipping equipment, and placarding. These rules are considered applicable to wastes shipped off site for laboratory analysis, treatment, or disposal.

Control of Air Emissions from Superfund Air Strippers at Superfund Groundwater Sites (OSWER Directive 9355.0-28) provides guidance criteria as to whether air emission controls are necessary for air strippers. For ozone nonattainment areas, a maximum 3 lb/hr or 15 lb/day or 10 ton/yr of VOC emissions is allowable; air pollution controls are recommended for any emissions in excess of these quantities.

General Pretreatment Regulations for Existing and New Sources of Pollutants (40 CFR Part 403) was promulgated under the Clean Water Act and includes provisions for effluent discharge to Publicly Owned Treatment Works (POTW). Discharge of pollutants that pass through or interfere with the POTW, contaminate sludge, or endanger health/safety of POTW workers is prohibited. These regulations should be used in conjunction with local POTW pretreatment program requirements.

Underground Injection Control Program (40 CFR Parts 144,147) regulations were promulgated under the Safe Drinking Water act to ensure that operation of an underground injection will not endanger drinking water sources by violating MCLs or by adversely affecting health. Typically, two types of wells apply to CERCLA sites:

-Class I well;	injection of wastes (or treated groundwater) beneath the lowermost formation containing an underground drinking water source
-Class IV well;	injection of wastes (or treated groundwater) into or above an underground drinking water source. Note that injection of untreated groundwater into a Class IV well is banned.

Toxic Substances Control Act (40 CFR Part 761.60-761.79 Subpart D Storage and Disposal) specifies treatment, storage, and disposal requirements for PCBs based on PCB concentration of the original material. Specifically, remediation for nonliquids (soil, rags, debris) exceeding 50 ppm is addressed in 40 CFR Section 761.6 Remediation for these nonliquids consists of incineration (in accordance with 761.70), chemical waste landfill (in accordance with 761.75), or an alternative treatment method attaining the same performance as incineration (typically 2 ppm measured in the treated residual).

OSHA Requirements (29 CFR Parts 1910, 1926, and 1904 regulates occupational safety and healthy requirements applicable to workers engaged in onsite field activities.

New York Environmental Conservation Law (New York Consolidated Laws Service; Article 17-Water Pollution Control, Article 37-Substances Hazardous or Acutely Hazardous to Public Health, Safety or the Environment, Article 71-Enforcement, and Article 72-Environmental Regulatory Program Fees) provides policy to require use of all known available and reasonable methods to prevent and control the pollution of state waters consistent with public health and use, propagation and protection of fish and wildlife, and the industrial development of the state.

New York Water Classifications and Quality Standards (New York Codes, Rules, and Regulations, Title 6-Environmental Conservation) Parts 700-704- Regulates the discharge of sewage, industrial waste or other wastes so as not to cause impairment of the best usages of the receiving water as specified by the water classifications at the location of discharge that may be affected by such discharge. Part 703-Surface Water and Groundwater Quality Standards and Groundwater Effluent Standards; Treated NWIRP site groundwater will likely be reinjected to groundwater so will need to comply with Groundwater Effluent Standards (see Table 2-X). The NWIRP site is in Nassau County, so will additionally have to comply with a maximum concentration of 1,000 mg/l total dissolved solids (TDS) and 10 mg/l total nitrogen (as N).

New York Regulations on State Pollutant Discharge Elimination System (New York Compilation of Rules and Regulations, Title 6-Environmental Conservation) prescribe procedures and substantive rules concerning discharges to state waters.

New York Solid and Hazardous Waste Management Laws (New York Consolidated Laws Service: Environmental Conservation Law, Article 27-Collection, Treatment and Disposal of Refuse and Other Solid Waste; Article 71-Enforcement, and Article 72-Environmental Regulatory Program Fees) addresses waste management policy and planning; waste transport permits; marketing of recyclable materials; state aid; solid waste management and resource recovery facilities; industrial hazardous waste management; siting of hazardous waste facilities; inactive hazardous waste disposal sites; storage, treatment, disposal and transportation of regulated medical waste, lead-acid battery recycling; enforcement, and program fees.

New York Rules for Siting Industrial Hazardous Waste Facilities (New York Compilation of Rules and Regulations, Title 6-Environmental Conservation) regulates the siting of new industrial hazardous waste facilities located wholly or partially within the state.

New York Waste Transport Permit Regulations (New York Compilation of Rules and Regulations, Title 6-Environmental Conservation) governs the collection, transport, and delivery of regulated waste, originating or terminating at a location within the state.

New York General Hazardous Waste Management System Regulations (Codes, Rules and Regulations of the State of New York, Title 6, Environmental Conservation) provides general definitions and sets forth state procedures for making information available to the public, confidentiality, petitioning equivalent testing methods, and petitioning for exclusion of a waste from a particular facility.

New York Rules on Hazardous Waste Program Fees (New York Codes, Rules and Regulations, Title 6-Environmental Conservation) addresses generator fees; treatment, storage, or disposal facility fees; and waste transporter fees.

New York Identification and Listing of Hazardous Wastes Regulations (New York Compilation of Rules and Regulations, Title 6-Environmental Conservation) establishes procedures for identifying solid wastes subject to regulation as hazardous wastes.

New York Hazardous Waste Manifest System Regulations (Codes, Rules and Regulations of the State of New York, Title 6- Environmental Conservation) establishes standards for generators; transporters; and treatment, storage or disposal facilities associated with the use of the manifest system and its recordkeeping requirements.

New York Hazardous Waste Treatment, Storage and Disposal Facility Permitting Requirements (New York Compilation of Rules and Regulations, Title 6-Environmental Conservation) regulates hazardous waste management facilities located within the state.

New York Final Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities (Codes, Rules and Regulations of the State of New York, Title 6-Environmental Conservation) establishes minimum state standards which define the acceptable management of hazardous waste.

New York Interim Status Standards for Owners and Operators of Hazardous Waste Facilities (Codes, Rules and Regulations of the State of New York, Title 6-Environmental Conservation establishes minimum state standards which define the acceptable management of hazardous waste during the period of interim status and until certification of closure.

New York Standards for Managing Specific Hazardous Wastes and Hazardous Waste Management Facilities (Codes, Rules and Regulations of the State of New York, Title 6-Environmental Conservation) contains requirements for generators and transporters of hazardous waste and for owners and operators of facilities managing hazardous wastes. Specifically addresses recyclable materials, hazardous waste or used oil burned for energy recovery, and reclaimed lead-acid batteries.

New York Rules for Inactive Hazardous Waste Disposal Sites (Codes, Rules and Regulation of the State of New York, Title 6-Environmental Conservation) applies to the development and implementation of programs to address inactive hazardous waste disposal sites. The goal for a specific site is to restore it to pre-disposal conditions, to the extent feasible and authorized by law. At a minimum, the remedy selected shall eliminate or mitigate significant threats to the public health and the environment. State review and concurrence with the selected remediation scheme will be required.

New York Land Disposal Restrictions Regulations (Codes, Rules and Regulations of the State of New York, Title 6-Environmental Conservation) identifies hazardous wastes that are restricted from land disposal and defines limited circumstances under which an otherwise prohibited waste may be land disposed.

New York Environmental Conservation Law (New York Consolidated Laws Service: Environmental Conservation Law, Article 1-General Provisions, Article 3-Department of Environmental Conservation, Article 5-State Environmental Board, Article 7-Council of Environmental Advisers, Article 8-Environmental Quality Review, Article 19-Air Pollution Control, Article 38-Chlorofluorocarbon

Compounds, Article 70-Uniform Procedures, Article 71-Enforcement and Article 72-Environmental Regulatory Program Fees) concerns the conservation, improvement and protection of state natural resources and environment and controls water, land and air pollution.

New York Air Pollution Control Regulations (Codes, Rules and Regulations of the State of New York, Title 6-Environmental Conservation) regulates emissions from specific sources. Part 212 General Process Emission Sources provides general requirements. For the most stringent rated contaminants (Rating A) emission rate potential greater than 1 lb/hr requires 99% or more removal or best available control technology; emission rate potential less than 1 lb/hr degree of air cleaning required shall be specified by the state. Part 231 regulates new source review for air contamination source projects in nonattainment areas. To be applicable, annual emissions form the source must exceed the de minimus emission limits. For volatile organics the de minimus emission limit is 40 tons per year.

2.2.3 Remedial Action Objectives

Remedial action objectives are being developed for both groundwater and soil. Continued long term exposure to the contaminated groundwater through ingestion and inhalation present the greatest potential public health risks at the site. To protect the public from these current and future health risks, as well as to protect the environment, the following remedial action objectives were developed:

(1) Prevent public exposure (through ingestion, inhalation, dermal contact) to groundwater having contaminants in concentrations greater than the remedial action goals.

(2) As implementable, restore contaminated groundwater to the remedial action goals.

(3) Comply with chemical-specific, location-specific, and action-specific ARARs and guidance.

The remedial action objectives are provided in Section 2.2.4.

If groundwater remediation goals cannot be achieved or the aquifer cannot be restored, then at a minimum the following remedial objectives will be met:

(1) Reduce public exposure (ingestion, inhalation, dermal contact) to groundwater having contaminants in concentrations greater than the remedial action levels.

(2) Prevent further offsite migration of contaminants.

For soils, dermal contact with PCB-1248 (Site 1 and Site 2) in surface and subsurface soil and dust inhalation of arsenic (Site 2) in surface soil are of concern. Additionally future leaching of trichloroethene, tetrachloroethane, and PCB-1248 to groundwater presents an ingestion and inhalation risk. To protect employees and residents from these future health risks, as well as to protect the environment, the following remedial action objectives were developed:

(1) Prevent public exposure (dermal contact, dust inhalation) to contaminated soils at Site 1 and Site 2 in concentrations greater than the remedial action goals.

(2) Prevent leaching of contaminants at resultant groundwater concentrations in excess of groundwater remediation goals.

(3) Comply with chemical-specific, location-specific, and action-specific ARARs and guidance.

The remedial action objectives are provided in in Section 2.2.4.

2.2.4 Remedial Action Goals

2.2.4.1 Soil

The remedial action goals for soils are presented in Table 2-R. There are no New York State standards or Federal standards for soil remediation. However, EPA guidance is available for PCB remediation at CERCLA sites. Generally, 10 mg/kg is an acceptable level for industrial sites and so 10 mg/kg has been

TABLE 2-R

SOIL REMEDIAL ACTION GOALS
NWIRP, BETHPAGE, NEW YORK [ug/kg]

CHEMICAL	REMEDIAL ACTION GOAL	BASIS
VOLATILE ORGANICS		
Trichloroethene	?	Risk-based
Tetrachloroethene	?	Risk-based
PCBs		
PCB-1248	10,000	EPA Guidance
TOXIC METALS		
Arsenic	?	Risk-based

selected for use at the NWIRP site. Of note the risk assessment indicates a future potential for PCB-1248 leaching to groundwater at unacceptable concentrations (Site 1 and Site 2). Remedial action goals for other contaminants are risk based and include trichloroethene, tetrachloroethene, and arsenic at Site 1.

2.2.4.2 Groundwater

Remedial action goals for groundwater are provided in Table 2-S. Basically, the most stringent promulgated standard has been utilized, including Federal MCLs/MCLGs, New York State MCLs, and New York State Groundwater Quality Standards, for the contaminants of concern. Proposed Federal standards are only considered when no other criteria is available; if proposed standards are less than the detection limit, the detection limit was selected for the remedial action goal. This strategy addresses all compounds identified as having a significant risk, except for vanadium. Therefore for vanadium, a risk-based goal was established corresponding to a Hazard Index less than 1.0.

Compounds with only a secondary MCL/MCLG are not of concern in establishing groundwater remediation goals but will be considered in establishing treatment levels associated with water quality of effluent from a treatment plant.

TABLE 2-S

GROUNDWATER REMEDIAL ACTION GOALS
NWIRP, BETHPAGE, NEW YORK [ug/l]

CHEMICAL	REMEDIAL ACTION GOAL	BASIS
VOLATILE ORGANICS		
Carbon Tetrachloride	5	Federal FMCL
1,1-Dichloroethane	5	NYS MCL
1,1-Dichloroethene	5	NYS MCL
1,2-Dichloroethene	5	NYS MCL
Ethylbenzene	5	NYS MCL
Tetrachloroethene	5	Federal FMCL
Toluene	5	NYS MCL
1,1,1-Trichloroethane	5	NYS MCL
Trichloroethene	5	Federal FMCL
Xylenes	5	NYS MCL
SEMI-VOLATILES		
Bis(2-ethylhexyl phthalate	50	NYS MCL
PCBs		
PCB-1248	0.1	NYS GWQS
TOXIC METALS		
Arsenic	25	NYS GWQS
Cadmium	5	Federal FMCLG
Chromium	50	NYS MCL
Hexavalent Chromium	50	NYS GWQS
Copper	200	NYS GWQS
Lead	25	NYS GWQS
Manganese	200	Federal LMCLG
Vanadium	?	Risk-based
Cyanide	100	NYS GWQS

NYS New York State
MCL Maximum Contaminant Level
L- Listed
F- Final
MCLG Maximum Contaminant Level Goal
GWQS Groundwater Quality Standard

2.3 GENERAL RESPONSE ACTIONS

2.3.1 Soil

2.3.1.1 Volume Estimation

TO BE ADDED

2.3.1.2 General Response Actions

Using the general response actions developed for the NWIRP Bethpage, future sections will identify the types of technologies (e.g., thermal treatment) and process options (e.g., incineration, low temperature thermal stripping) associated with these technologies. These will be screened for technical implementability, and a representative process option will be selected for applicable and implementable technologies. The selected process options will then be assembled into remedial alternatives for soils at each site. Listed below are the seven general response actions that were identified for the NWIRP soils.

- No Action
- Institutional Controls
- Removal
- Containment
- In-Situ Treatment
- Treatment
- Disposal

2.3.2 Groundwater

2.3.2.1 Area for Treatment

TO BE ADDED

2.3.2.2 General Response Actions

Using the general response actions developed for the NWIRP Bethpage, future sections will identify the types of technologies (e.g., physical treatments) and process options (e.g., activated carbon adsorption,

ambient-temperature air stripping, high-temperature steam stripping) associated with these technologies. These will be screened for technical implementability, and a representative process option will be selected for applicable and implementable technologies. The selected process options will then be assembled into remedial alternatives for overall groundwater. Listed below are the seven general response actions that were identified for the NWIRP onsite and nearsite groundwater.

- No Action
- Institutional Controls
- Removal
- Containment
- In-situ Treatment
- Treatment
- Discharge

2.4 IDENTIFICATION AND SCREENING OF TECHNOLOGIES AND PROCESS OPTIONS

TO BE ADDED